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PANOGRAPHIC SURVEY OF U. S. ARMY RECRUITS:
ANALYSIS OF DENTAL HEALTH STATUS

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The opinions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of the Defense.

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ABSTRACT

✓ Panoramic radiographs of 5,000 Army recruits were taken to record the incidence of pathoses in the maxillomandibular region, and to evaluate their dental health status. One hundred seventy-six recruits demonstrated no pathoses. The most frequently occurring lesions in this study group were unerupted teeth, carious teeth, defective restorations, and periodontal disease. The authors found the panoramic survey to be an effective means of evaluating the dental health status of a large population.

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INTRODUCTION

Panoramic radiography is widely employed as a diagnostic aid in dentistry. In addition to being a simple procedure for both the patient and the operator, it affords the convenience of visualizing both dental arches on a single film with an economy of time and radiation exposure.^{1,2} Its broad area of coverage, to include many extraoral structures of the head and neck, allows detection of pathoses which may not be evident on a routine periapical survey.³⁻⁶

The advantages of panoramic radiography make it particularly attractive for mass-screening examinations of large populations. Many investigators have successfully utilized panoramic techniques to survey selected groups of patients.⁵⁻¹⁴ Despite the recognized disadvantages of distortion, poor definition, and an ineffectiveness in detection of early carious lesions,¹⁵ the value in rapidly assessing the oral health status of a large population was repeatedly noted by these authors.

Panoramic radiography was utilized in this study to investigate the incidence of selected pathologic conditions in a group of 5,000 U. S. Army recruits. Results support this technique as a suitable mass screening method.

MATERIALS AND METHODS

During in-processing at the reception center of Fort Leonard Wood, Missouri, a panoramic radiograph* of 5,000 U. S. Army recruits, aged 17 through 26 years, was taken by qualified technicians as a part

*American X-Ray-PX-1000 System, Englewood, NJ and PanelipseTM GE-3000, G.E. Electric Co., Milwaukee, WI

of the dental examination in 1980. All radiographs were processed by the recommended technique. They were examined by a single reviewing dentist (P.S.G.) using a view-box in a dimmed room and the findings were recorded.

In determining the incidence of carious involvement, interproximal radiolucencies between mandibular and maxillary anterior teeth were not recorded, since images may have been non-metallic restorations. In addition, only gross carious lesions were recorded in posterior teeth. Defective restorations, recurrent caries, overhangs, and open contacts were recorded together as one finding.

Periodontal disease status was determined by examining the relationship between the crestal alveolar bone and cemento-enamel junction. Moderate periodontal disease was defined as alveolar bone loss of 4 mm or less. A horizontal bone loss of more than 4 mm, or a 4 mm vertical bony defect, was recorded as severe periodontal disease. The incidence of periodontal bone loss suggestive of juvenile periodontitis was recorded when only first molars were involved.

All teeth that appeared to be restricted in eruption by either bone or adjacent teeth were recorded as unerupted teeth. Apical radiolucencies, due to pulpal and/or periodontal pathoses, were recorded together as periapical radiolucencies. Radiolucent lesions, other than periapical or anatomical, were recorded separately. Follicular enlargements (over 3 mm) surrounding third molars were included in this category. Radiopaque lesions of either an odontogenic or

non-odontogenic nature were recorded together. Foreign bodies identifiable by radiodensity or shape, were recorded separately. Roots remaining were classified as either residual roots (severe caries) or retained root tips (following extractions).

Other findings were also observed, i.e., disturbances in odontogenesis, missing teeth, and antral retention cysts.

RESULTS

Table 1 summarizes the findings.

Dental Caries. A 58 percent incidence of carious lesions was noted overall. Many of these lesions appeared to involve the pulp with periapical radiolucencies. Defective restorations, recurrent caries, and open contacts constituted 21 percent.

Periodontal Pathoses. Radiopacities suggestive of supra and/or subgingival calculus were seen in 308 individuals (6 percent). Evidence of bone loss suggestive of moderate periodontal disease was seen in 699 individuals (14 percent), severe periodontal disease in 18 individuals (0.4 percent) and juvenile periodontitis in 68 individuals (1.4 percent). The overall incidence of periodontal disease was 15.6 percent.

Unerrupted Teeth. An average of 2.28 unerupted teeth per individual was noted. The majority of these were third molars. Maxillary third molars accounted for 49.55 percent and mandibular third molars 44.49 percent.

Missing Teeth. Four participants were completely edentulous and another 35 were edentulous in either the maxillary or mandibular arch. Distribution of missing teeth is shown in Table 2. Third molars were excluded.

DISCUSSION

Panoramic radiography is a well accepted adjunct to conventional intraoral radiography and has several distinct advantages and disadvantages.¹¹ Although limitations do exist, it has great potential for routine screening of large groups of people. An added benefit is having an important tool available for forensic purposes. Due to the sheer number of new military recruits entering a basic training site, a dental survey technique must be expedient. The necessary information derived must also allow the diagnosis of moderately advanced dental pathoses. When further diagnosis and treatment planning are required, other diagnostic aids will be utilized as indicated.

The initial dental health survey is important to allow the United States Army Dental Health Managers to be advised of current dental requirements. This is necessary for proper logistical support and planning. The military has the unique responsibility of remote critical assignments where dental support is not easily available. It is incumbent that military personnel be relatively free of dental emergency situations. Most significantly, such dental emergencies can occur at an area of strategic location, during training, in combat, and

while a prisoner of war.²¹ The factors predisposing to emergency condition are well known to the dental profession, but their incidence is not well delineated. This will be the subject of another study.¹⁶

Many panographic surveys of large population groups have been conducted. The annual meeting of the American Dental Association has sponsored a health examination which included a panoramic radiograph. Several of these findings have been reported.⁸⁻¹³ Other surveys have been conducted at a Veterans' Administration Hospital,⁵ dental schools,⁴⁻¹⁴ and of Air Force personnel.⁷ Several discrepancies in findings are evident. These are probably explained by the variance in age groups and diagnostic methods. The Air Force inductees were also evaluated with the aid of a Polaroid color photograph, but the emphasis was on periodontal health. No recordings were made of caries, but a 50 percent rate of gingivitis was noted. We were not able to determine gingival health status, but our 58 percent incidence of caries was most significant. This compared with the Canadian Armed Forces recruit survey⁶ of a caries rate of 78 percent. This rate is even more significant when it is realized the clinical examination and other radiographs were not utilized and only gross caries in posterior teeth were recorded. This need for restorative procedures constitutes a major dental care requirement. In a civilian population, caries-related conditions account for about 40 percent of all dental emergencies.²² Our study, which indicated 1.5 restorations needed per person, is only based upon panoramic radiographic examination and

is undoubtedly low.

The overall incidence of periodontal disease reported in this study was 15.6 percent, which compared favorably to Hobson's study¹⁷ (22 percent). The incidence of juvenile periodontitis seems to be variable in the literature. The incidence of 1.36 percent of juvenile periodontitis among U. S. Army recruits seems high as compared to Lacy and Brasher's study²³ among military population (0.4 percent).

The highest percentage of missing teeth (14.6 percent) was 1 or 2 teeth. Other percentages are given in Table 2. This reflects a great restorative workload should all missing teeth need to be replaced.

The abnormally high percentage of recruits who had unerupted teeth (96.5 percent) that was noted may be due to the young age of our sampling. Morris et al.²⁴ reported that 66 percent of 19.5 year-old men have from one to four embedded third molars based upon his survey of United States Air Force recruits.

The incidence of the mucous retention cyst of the maxillary sinus (2.85 percent) was not surprising. Halstead¹⁹ and Lyon³ have demonstrated the reliability of panoramic radiography in detection of maxillary sinus pathoses.

Very little improvement in the dental health of the inductee has occurred since 1956¹⁷ and 1973.¹⁸ A significant dental workload is represented by these figures and requires extensive dental treatment capabilities.

SUMMARY

A panoramic radiographic survey of 5,000 U. S. Army recruits, aged 17 through 26 years, was taken to record the incidence of pathoses in the maxillomandibular region and to evaluate their oral health status without a clinical examination. The frequently occurring lesions in the population studied were as follows:

1. 96.5 percent had unerupted teeth.
2. 57.7 percent had carious lesion.
3. 20.9 percent had defective restorations.
4. 15.6 percent had periodontal disease.

One hundred and seventy-six (3.52 percent) recruits demonstrated no pathosis.

Table 1. Findings based on panoramic radiographic survey of 5,000 U. S. Army recruits, grouped according to most suggestive diagnosis.

Radiographic pathosis highly suggestive of:	Number of abnormalities	Number of participants	Percent of participants
1. No pathology	-	176	3.52
2. Dental caries	3,334	2,885	57.7
3. Defective restorations, recurrent caries and open contents	2,545	1,046	20.92
4. Supra- or subgingival calculus	462	308	6.16
5. Moderate periodontal disease	-	699	13.88
6. Severe periodontal disease	-	18	0.36
7. Juvenile periodontitis	-	68	1.36
8. Periapical radiolucencies	419	378	7.56
9. Radiolucent lesions	963	881	17.62
10. Radiopaque lesions - odontogenic & non-odontogenic	84	58	1.16
11. Residual root tips	378	246	4.92
12. Unerupted teeth	10,979	4,824	96.48
13. Germination & twinning	15	14	0.28
14. Fusion, concrescence and dilaceration	62	33	0.66
15. Retained primary teeth	142	94	1.88
16. Supernumerary teeth	85	68	1.36
17. Edentulous	43	39	0.74
18. Retained root tips	7	4	0.08
19. Mucous retention cyst of maxillary sinus	145	142	2.85
20. Foreign bodies	23	19	0.38

Table 2. Percentage of participants and number of missing teeth.

<u>Total missing teeth</u>	<u>Number of participants</u>	<u>Percentage</u>
1 - 2	730	14.6
3 - 5	315	6.3
6 - 9	64	1.28
10 - 9	24	0.48
15 - 20	10	0.28
27 - 27	3	0.06

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